

ABSTRACT

A continuously variable fluent control valve for controlling supersonic flow of gas. The valve has an upper plate with a very slightly angled physical control surface and a lower plate with a physical nozzle inlet. As the valve opens and closes during supersonic flow, a hydrodynamic pintle forms in the nozzle inlet just below the physical control surface. The hydrodynamic pintle provides a fluid control surface for redirecting flow from horizontal flow to vertical flow through the nozzle and, depending on the expansion needs of the supersonic flow, the hydrodynamic pintle changes shape, expanding or shrinking in the axial direction of the valve. Because of the nearly flat physical control surface of the upper plate, material ablation is significantly reduced. The fluid-fluid boundary between the hydrodynamic pintle and the supersonic flow produces a flow through the nozzle with little or no recirculation.